

## Segregation of Degradable and Non Degradable using Sensor

Segregación de sensor degradable y no degradable  
usando

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### Abstract

All around us, from the things we consume to the things we victual can be classified into two groups- degradable and non-degradable. Natural goods like paper, vegetable peels, etc. are degradable products, which mean they can be consumed by the microorganisms and returned to the nature. On the other hand, products like glass, synthetic rubber and steel come under the category of non-degradable. These things are not decomposed by the action of microorganisms and they stay in our environment for hundreds of years polluting our land and the whole ecosystem. When we have perceived the damage non-degradable items are provoking on our planet, we have to discover perceptive arrangements keeping in mind the end goal to handle these issues. We certainly cannot ostracize the engenderment and utilization of such materials planarity but vary methods can be adopted to avail the planet. To separate the waste so far, we have used different bins with different colors, where some color that indicate non-degradable and some color that denote degradable. It needs the better knowledge for human to segregate the waste material. To avoid this, we proposed the idea to segregate degradable and non-degradable wastes from dustbins where the dustbins itself has the knowledge to segregate by using Sensor. The ultrasonic sensor, Metal detection sensor, Plastic detection sensor, Proximity Capacitive sensor to detect glass and paper and are used for segregation and a robotic hand is used to pick and place bins overflow respectively. The Digital IR sensor is to intimate the overflow of the dustbin. Finally, the IOT process is used to intimate the status of the material in the dustbin to the concern person.

**Keywords:** Smart Dustbin, Ultrasonic Sensor, Robotics hand, Arduino, Waste Segregation.

## Resumen

Todo lo que nos rodea, desde las cosas que consumimos hasta las cosas que comemos, se pueden clasificar en dos grupos: degradables y no degradables. Los productos naturales como papel, cáscaras de verduras, etc. son productos degradables, lo que significa que pueden ser consumidos por los microorganismos y devueltos a la naturaleza. Por otro lado, productos como vidrio, caucho sintético y acero entran en la categoría de no degradables. Estas cosas no se descomponen por la acción de microorganismos y permanecen en nuestro medio ambiente durante cientos de años contaminando nuestra tierra y todo el ecosistema. Cuando hemos percibido el daño que provocan los elementos no degradables en nuestro planeta, tenemos que descubrir arreglos perceptivos teniendo en cuenta el objetivo final para manejar estos problemas. Ciertamente no podemos aislar el engendramiento y la utilización de la planeidad de tales materiales, pero se pueden adoptar diversos métodos para aprovechar el planeta. Para separar los residuos, hemos utilizado diferentes contenedores con diferentes colores, donde algunos colores que indican no degradable y algunos colores denotan degradable. Necesita el mejor conocimiento para que los humanos segreguen el material de desecho. Para evitar esto, propusimos la idea de segregar los desechos degradables y no degradables de los cubos de basura, donde los cubos de basura en sí tienen el conocimiento para segregar mediante el uso de sensores. El sensor ultrasónico, sensor de detección de metal, sensor de detección de plástico, sensor de proximidad capacitiva para detectar vidrio y papel y se utilizan para la segregación y una mano robótica se utiliza para recoger y colocar desbordamiento de contenedores, respectivamente. El sensor IR digital es para intimidar el desbordamiento del cubo de basura. Finalmente, el proceso IOT se utiliza para identificar el estado del material en el cubo de basura con la persona que lo ocupa.

**Palabras clave:** Cubo de basura inteligente, Sensor ultrasónico, Robótica mano, Arduino, Segregación de residuos.

## Resumo -

Tudo ao nosso redor, das coisas que consumimos às coisas que podemos obter, pode ser classificado em dois grupos - degradável e não degradável. Bens naturais, como papel, cascas de vegetais, etc., são produtos degradáveis, o que significa que podem ser consumidos pelos microrganismos e devolvidos à natureza. Por outro lado, produtos como vidro, borracha sintética e aço entram na categoria de não degradáveis. Essas coisas não são decompostas pela ação de microorganismos e permanecem em nosso meio ambiente por centenas de anos poluindo nossa terra e todo o ecossistema. Quando percebemos os danos que os itens não degradáveis estão provocando em nosso planeta, precisamos descobrir os arranjos perceptivos, tendo em mente o objetivo final de lidar com esses problemas. Certamente não podemos excluir o engendramento e a utilização dessa planaridade de materiais, mas vários métodos podem ser adotados para aproveitar o planeta. Para separar o lixo, usamos diferentes caixas com cores diferentes, onde algumas cores indicam não-degradável e alguma cor que denota degradável. É necessário o melhor conhecimento para o ser humano para segregar o material residual. Para evitar isso, propusemos a ideia de separar os resíduos degradáveis e não degradáveis dos caixotes de lixo, onde os próprios caixotes de lixo têm o conhecimento para segregar utilizando o Sensor. O sensor ultra-sônico, sensor de detecção de metal, sensor de detecção de plástico, sensor de proximidade de proximi

dade para detectar vidro e papel e são usados para segregação e uma mão robótica é usada para escolher e colocar caixas de estouro, respectivamente. O sensor IR digital é para intimar o estouro do caixote do lixo. Finalmente, o processo IOT é usado para intimar o status do material no caixote do lixo para a pessoa em questão.

**Palavras-chave:** Caixote de lixo inteligente, Sensor ultra-sônico, Mão de robótica, Arduino, Segregação de resíduos.

## I. INTRODUCTION

Unlike biodegradable wastes, non-biodegradable cannot be easily handled. Non-biodegradable wastes are those who cannot be decomposed or dissolved by natural agents. They remain on earth for thousands of years without any degradation. Hence the threat caused by them is also more critical. A notable example is the plastics which are a commonly used material in almost every field. To give these plastics a long lasting effect, improved quality plastics are being put to use. This made them more temperature resistant and more durable even after use. Other examples are cans, metals, and chemicals for agricultural and industrial purposes. They are the main causes of air, water and soil pollution and diseases like cancer. So that it is necessary to monitor the waste in the garbage bin. In general, people are collecting the waste after that they are segregated as biodegradable and non-biodegradable waste by using some methodologies. The various methodologies used to separate waste. In this paper, ultrasonic sensor is used for separating the waste, moisture and the level of the garbage bin is detected with the help of digital sensor system. Arduino is interfacing the sensor system with IoT.

**Smart Dustbin: An Efficient Garbage Monitoring System:** The limit sensor and ultrasonic is used for detecting the level of the garbage bin and it is working based on the weight of the bin. In some Cases the garbage bin are assumed to be open.

**Degradable and Non-degradable Wastes Separation Using Robotic Hand:** The waste is detected and separated using robotic hand using the ultrasonic sensor.

## I. INTRODUCCIÓN

A diferencia de los desechos biodegradables, los no biodegradables no se pueden manipular fácilmente. Los residuos no biodegradables son aquellos que no pueden descomponerse ni disolverse con agentes naturales. Permanecen en la tierra durante miles de años sin ninguna degradación. Por lo tanto, la amenaza que causan es también más crítica. Un ejemplo notable son los plásticos que son un material comúnmente utilizado en casi todos los campos. Para dar a estos plásticos un efecto de larga duración, se utilizan plásticos de mejor calidad. Esto los hizo más resistentes a la temperatura y más duraderos incluso después de su uso. Otros ejemplos son latas, metales y productos químicos para fines agrícolas e industriales. Son las principales causas de la contaminación del aire, el agua y el suelo y enfermedades como el cáncer. Por lo tanto, es necesario controlar los desechos en el contenedor de basura. En general, las personas están recolectando los desechos después de que se segregan como desechos biodegradables y no biodegradables mediante el uso de algunas metodologías. Las diversas metodologías utilizadas para separar los residuos. En este documento, el sensor ultrasónico se utiliza para separar los residuos, la humedad y el nivel del cubo de basura se detecta con la ayuda del sistema de sensor digital. Arduino está interconectando el sistema del sensor con IoT.

**Cubo de basura inteligente: un sistema de monitoreo de basura eficiente:** El sensor de límite y el ultrasonido se utilizan para detectar el nivel del contenedor de basura y funciona en función del peso del contenedor. En algunos casos, se supone que el

## II. RELATED WORK

In this research analysis, we choose smart garbage bin which separate the non degradable and degradable waste. ShubhamThakker et al.,

[1] proposed smart garbage bin that will automatically send a message when the bin is become to fill using GSM technology. This paper uses NIR reflectance spectroscopy method to differentiate and remove plastic item from MSW. Vishnupriya et al.,

[2] proposed automatic finding sensor. It used three partition in the dustbin to segregate the non degradable and degradable. Also it sent mess through IoT when the dustbin becomes filled. Rashmi et al.,

[3] proposed waste segregation using PLC. Twinkle sinha et al.,

[4], Prof.J.S.Chitode et al.,

[5] & Narendra Kumar et al., [6] proposed to intimate when the dust bin get filled. R.Sathiyakala et al., [7] Proposed to clean the sewage. et al., [10] Proposed to sort various plastic items.

Fernandes et al., [11], Safavi et al., [17] proposed the sort different categories of plastics bottles, glass bottles, metal cans. Pushpa MK et al., [19] proposed three major classes: dry, wet, metallic.

## III. SEGREGATION OF WASTE

Arduino is an open source prototyping platform based on hardware and software. Acting as an interface between garbage bin and Internet of Things (IoT). Power supply is a reference to a source of electrical power. It is used to provide DC voltage to the components. In this paper, 12V of external power supply is applied to the components. An ultrasonic sensor is an electronic device, used to sense the waste in the surroundings. Digital IR sensor is used to detect the overfull of the garbage bin. Analog IR sensor is used for segregation of bio- degradable and non bio-degradable waste.

contenedor de basura está abierto. Separación de desechos degradables y no degradables con mano robótica: los desechos se detectan y separan utilizando una mano robótica utilizando el sensor ultrasónico.

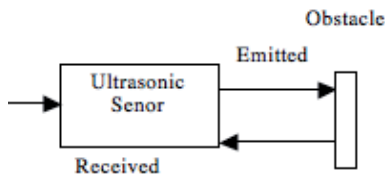


Fig 1: Ultrasonic Sensor

Internetworking of physical object with software that enables to collect and exchange data. Through Internet of things we can intimate the message as “Garbage bin is overfull” in the webpage or as an app in mobile. An automated arm is a kind of mechanical arm, generally programmable with comparable capacities to a human arm. It is settled in the focal piece of the waste container. Coding controls the robotic arm by rotating individual servo motors connected to each joints. This arm picks and places the waste in the bio-degradable and non bio-degradable bin

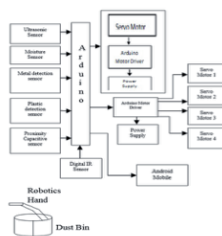


Fig 2: Working Principle of Waste Segregation

A servomotor is a revolving actuator or direct actuator that takes into consideration exact control of precise or straight position, speed and increasing speed. In this paper, four servo motors are connected to control the robotic arm movements. The actions controlled by servo motor are rotating front, back, ups and downs and gripping of waste.

## SPECIFICATION

- Arduino UNO
- Mini breadboard
- L298 motor driver module
- 2x dc motors with wheels
- HC-SR04 ultrasonic sensor, Moisture Sensor, Plastic and Metal detection Sensor, Proximity capacitive Sensor.
- Micro servo motor
- Button
- Red LED
- 220 Ohm resistor
- 9V battery holder (with or without power jack)
- 8 spacers (male-female), 8 nuts and 8 screws
- Dimension: 22.5 x 12 x 35.5 mm approx
- Robotic Hand
- Stall torque: 1.8 kgf·cm (4.8V), 2.2 kgf·cm (6 V)
- Operating speed: 0.1 s/60 degree (4.8V), 0.08 s/60 degree (6V)
- Operating voltage: 4.8 V-6.0

## IV. PROCESS FLOW

The garbage bin is divided into three parts. The waste are collected in the centre part and another two parts is for bio-degradable and non bio-degradable waste. The arm is fixed at the centre part of the garbage bin to pick the waste, which is collected in the centre part of the bin. The ultrasonic sensor is placed at the arm. The arm picks single waste at a time and sense the waste using the sensor. The sensor sends IR ray, some of the rays is absorbed by the waste and remaining are returned to the sensor. According to the return voltage value of the analog ultrasonic sensor the waste is detected and placed in bio- degradable in one side and non bio-degradable waste in other side. The digital IR sensor is fixed at the sides of the garbage bin to detect the level the waste in the bin. If the waste reach the overfull level, then the ray which is being transmitted from transmitter digital IR sensor is received by receiver

digital IR sensor have been disconnected. This disconnection between transmitter digital IR sensor and receiver digital IR sensor is said to be overfull of garbage. The message as “garbage bin is overfull” is intimated as a message to the concern person in both webpage and app in mobile phone.

## V. RESULT AND DISCUSSION

The proposed system “Segregation of degradable and non degradable using Sensor” sorts wastes into two different categories, namely degradable product and non degradable waste. Separating our waste is essential otherwise the amount of waste being generated today causes immense problem. Here, we have tested the household wastes, which are generated in every home. First the ultrasonic sensor sense the obstacle, move to that direction, and sense whether the obstacle is metal, paper or moisture. After sensing the obstacle it pick by using the robotic hands. After that it place in the right side when it is non-degradable and degradable in the left side. When the bin become full, the sensor sense and it send the message to the respective android phone.

## VI. CONCLUSION AND FUTURE ENHANCEMENT

This project goal is to monitor the waste in the surrounding, pick and place the waste in the bins after detecting biodegradable and non-biodegradable waste and intimating the status of the bins to the concern person using the IOT technique. This will helps to maintain a clean environment by cyclic cleaning procedure and reduce the pollution. This project will helpful for the government sector and home. In this project, only segregating the waste for the particular surrounding. In future it will be implemented for large scale organizations.

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